[090] The invention claimed is:

1. An adapter for connection between a cardiac lead having a distal end including a plurality of electrodes adapted to be associated with a heart of a patient and a proximal end, and a cardiac pacing device, said adapter comprising:

a first connector that receives said proximal end;

a second connector for connection to said cardiac pacing device and having contacts; and

a multiplexer having an input connected to said first connector, an output, and a selector connected to the first connector to couple a group of electrodes of said cardiac lead to said contacts through said output.

2. The adapter of claim 1 wherein said selector comprises:

a plurality of links, each link being connected said input and said output;

3. The adapter of claim 2 wherein said links are permanently settable in one of an open and closed position;.

4. The adapter of claim 3 wherein said links are fusible.

5. The adapter of claim 4 wherein said fusible links are responsive to an electrical signal.

6. The adapter of claim 5 wherein said links close in response to said electrical signal.

7. The adapter of claim 3 wherein said links are breakable.

8. The adapter of claim 7 wherein said links open in response to an electric signal.

9. The adapter of claim 1 wherein the selector comprises a plurality of electric switches, wherein each switch has a first terminal connected to an electrode of said cardiac lead, a second terminal connected to a contact of said second connector, and control terminal that is responsive to a control signal to selectively open and close the respective switch.

10. The adapter of claim 9 wherein said switches are FET transmission gates.

11. The adapter of claim 10 further comprising a control circuit connected to the control terminal of each switch to provide said control signals.

12. The adapter of claim 11 further comprising a programming interface connected to the control circuit to provide an encoded programming signal

indicating which electrodes are to be connected to which contacts , said control circuit being adapted to decode said encoded programing signal to produce said control signal.

13. The adapter of claim 12 wherein said programming interface comprises:

a radio frequency receiver attached to said control circuit to receive said encoded programming signal from a remote radio frequency transmitter.

14. The adapter of claim 1 wherein said multiplexer is electrically operated.

15. The adapter of claim 14 further comprising a power conversion circuit to convert a portion of the energy present in a stimulation pulse provided by the cardiac pacing device to a voltage to power said multiplexer.

16. An adapter of claim 15 wherein the power conversion circuit comprises a battery to provide backup power.

17. The adapter of claim 15 wherein the power conversion circuit comprises a capacitor to receive and retain said energy from the pacing pulse.

18. The adapter of claim 17 wherein the power conversion circuit further comprises:

a first diode connected between a pacing contact of the second connector and the multiplexer circuit to prevent power from being fed to the cardiac pacing device, while allowing said pacing pulse to be received by the capacitor; and

a second diode connected between the battery and the multiplexer to prevent the pacing pulse from interacting with said battery.

19. An adapter connected between a cardiac lead having a distal end including a plurality of electrodes adapted to contact a patient's heart and a proximal end having plurality of terminals, each terminal being connected to one electrode, and a cardiac stimulation device capable of functioning with less electrodes than the number of electrodes in said lead and including a sensing and a stimulation contact, said adapter comprises:

a first connector that receives said plurality of connector terminals of the cardiac lead;

a first multiplexer having an input connected to said first connector, a selector connected to the input to couple a first group of electrodes of said cardiac lead, and an output to transfer sensing signals from said first group of electrodes;

a second multiplexer having an input connected to said first connector,

a selector connected to said input to couple a second group of electrodes of said cardiac lead, and an output to transfer pacing signals to said second group of electrodes; and

a second connector having contacts connected to said cardiac stimulation device and said output of said multiplexer to transfer said sensing signals and the pacing signals between said groups of electrodes and said cardiac pacing device.

20. The adapter of claim 19 further comprising a control circuit connected to selectors to operate said multiplexes.

21. The adapter of claim 20 wherein said control circuit includes a sense control circuit adapted to sense the absence of a stimulation pulse from said cardiac stimulation device to operate said first multiplexer.

22. The adapter of claim 20 wherein said control circuit includes a pacing control circuit connected to said second connector to sense the presence of a stimulation pulse from the cardiac stimulation device to deactivate the first multiplexer and activate the second multiplexer to connect the second group of electrodes to said contacts to allow said stimulation pulse to be transferred to said second group of electrodes.

23. The adapter of claim 19 wherein said selectors each comprise a plurality of switches, each switch has a first switch terminal connected to a connector terminal, a second switch terminal connected to a contact, and

control terminal that receives a control signal that causes the first switch terminal to be connected to the second switch terminal.

24. The adapter of claim 23 wherein the switches are FET transmission gates.

25. The adapter of claim 19 further comprising a programming interface connected to said control circuit to provide an encoded programming signal indicating which electrodes are to be connected to said contacts.

26. The adapter of claim 25 wherein said programming interface comprises:

a radio frequency receiver attached to said control circuit to receive said encoded programming signal as a radio frequency transmission from a radio frequency transmitter remote from said hear.

27. The adapter of claim 19 further comprising a power conversion circuit connected to one of said contacts to convert a portion of the energy present in a stimulation pulse provided by the cardiac stimulation device to a voltage to power said adapter.

28. The adapter of claim 27 wherein the power conversion circuit comprises a battery connected to the multiplexer to provide backup power voltage to power the multiplexer in the absence of a stimulator pulse.

29. The adapter of claim 28 wherein the power conversion circuit further comprises a capacitor in communication with said one contact to receive and retain said energy from said stimulation.

30. The adapter of claim 29 wherein the power conversion circuit further comprises:

a first diode connected between said one contact and the multiplexer circuit to prevent voltage of said battery from being fed to said cardiac stimulation device, while allowing said stimulation pulse to be received by the capacitor; and

a second diode connected between said battery and said multiplexer to prevent said stimulation pulse from interacting with said battery.

31. A cardiac pacing system comprising:

a cardiac lead having a distal end including a plurality of electrodes adaptable to be implanted within a heart and a proximal end having plurality of lead terminals, each lead terminal being connected to one of said electrodes;

a cardiac stimulation device capable of receiving and functioning with a less number of electrodes than the electrodes in said lead; and

an adapter connected between said cardiac lead and said cardiac stimulation device, said adapter including:

a first connector that mates with said terminals;

a multiplexer having an input connected to said first connector, a selector connected to said input to chose a group of electrodes, and an output; and

a second connector compatible with and connected to said cardiac stimulation device; and

being connected to said output to transfer said sensing signals and said stimulation signals between the chosen group of electrodes and the cardiac stimulation device.

32. The cardiac pacing system of claim 31 wherein said selector comprises:

a plurality of links, each link being connected between each one of said terminals, and

a link programmer to activate one of said links to selectively connect a respective terminal uniquely with one of said contacts.

33. The cardiac pacing system of claim 32 wherein said link programmer selectively generates a voltage and wherein said links are fusible links, which, in response to said voltage are fused to form a closed electrical path.

34. The cardiac pacing system of claim 32 wherein said links are breakable links, wherein said programmer is adapted to generate high current, and wherein said breakable links are responsive to said current to break said connection.

35. The cardiac pacing system of claim 31 wherein said selector comprises a plurality of switches, each switch has a first switch terminal connected to a lead terminal, a second switch terminal connected to one of said contacts, and control terminal that receives a control signal that causes said first terminal switch to be connected to the second switch terminal.

36. The cardiac pacing system of claim 35 wherein the switches are FET transmission gates.

37. The cardiac pacing system of claim 35 wherein the adapter further comprises a control circuit connected to the control terminal of each switch to provide said control signals to selectively activate said switches.

38. The cardiac pacing system of claim 37 wherein said adapter further comprises a programming interface connected to the control circuit to provide an encoded programming signal indicating which electrodes are to be connected to which contacts, and wherein said control circuit decodes said encoded programming signal to form the control signal.

39. The cardiac pacing system of claim 38 wherein said programming interface comprises:

a radio frequency receiver attached to said control circuit to receive said encoded programming signal as a radio frequency transmission from a remote radio frequency transmitter.

40. The cardiac pacing system of claim 31 wherein said adapter further comprises a power conversion circuit to provide a voltage to power said multiplexer.

41. The cardiac pacing system of claim 40 wherein said power conversion circuit comprises a battery connected to said multiplexer to provide said voltage in the prolonged absence of said pacing pulses.

42. The cardiac pacing system of claim 41 wherein said power conversion circuit further comprises a capacitor in communication with a pacing contact of the contacts to receive and retain said energy from said pacing pulse.

43. The cardiac pacing system of claim 42 wherein the power conversion circuit further comprises:

a first diode connected between said pacing contact and said multiplexer circuit to prevent voltage from said battery from being fed to said cardiac pacing device, while allowing said pacing pulse to be received by said capacitor; and

a second diode connected between said battery and the multiplexer to prevent said pacing pulse from interacting with said battery.

44. A cardiac pacing system comprising:

a cardiac lead having a distal end including a plurality of implantable electrodes and a proximal end having plurality of lead terminals, each lead terminal being connected to one electrode;

a cardiac pacing device adapted to function with less cardiac electrodes than the number of electrodes in said lead; and

an adapter connected between said lead and said cardiac pacing device, said adapter including:

a first connector that mates with said lead terminals;

a sensing multiplexer having a sense input connected to said first connector, a sense selector connected to said sense input to chose a first group of electrodes from said plurality of electrodes, and a sense output to transfer sensing signals and signals from said first group of electrodes;

a pace multiplexer having a pace input connected to said first connector, a pace selector connected to said pace input to chose a second group of electrodes from said plurality of electrodes, and a pace output to transfer pacing signals to said second group of electrodes;

a second connector having contacts and being connected to said cardiac pacing device and said pace output to transfer said pacing signals between said groups of electrodes and said cardiac pacing device;

a sense control circuit connected to said first multiplexer and said contacts to sense an absence of a pacing pulse from said cardiac pacing device to activate said first multiplexer to connect said first group of electrodes to said second connector such that said cardiac pacing device can sense intrinsic cardiac activity; and

a pace control circuit connected to said second multiplexer and said contacts of the second connector to sense the presence of said pacing pulse to deactivate said first multiplexer and activate said second multiplexer to connect said second group of electrodes to said contacts to allow said pacing pulse to be applied to said second group of electrodes.

45. The cardiac pacing system of claim 44 wherein selectors each comprise a plurality of switches, whereby each switch has a first switch terminal connected to one lead terminal, a second switch terminal connected to one of said contacts, and a control terminal that is responsive to a control signal that causes the first switch terminal to be connected to the second switch terminal.

46. The cardiac pacing system of claim 45 wherein the switches are FET transmission gates.

47. The cardiac pacing system of claim 46 wherein said adapter further comprises a programming interface connected to said control circuit to provide an encoded programming signal indicating which electrodes are to

be connected to which contacts, said control circuit being adapted to decode said encoded programming signal to generate the control signal.

48. The cardiac pacing system of claim 47 wherein said programming interface comprises:

a radio frequency receiver attached to said control circuit to receive said encoded programming signal as a radio frequency transmission from a remote radio frequency transmitter.

49. The cardiac pacing system of claim 45 wherein said adapter further comprises a power conversion circuit connected between said contacts and said multiplexer to convert a portion of the energy present in a pacing pulse provided by said cardiac pacing device to a voltage to power said multiplexer.

50. The cardiac pacing system of claim 49 wherein said power conversion circuit comprises a battery to provide the voltage to power said multiplexer when said cardiac pacing device does not provide said pacing pulse.

51. The cardiac pacing system of claim 50 wherein the power conversion circuit further comprises a capacitor in communication with a pacing contact of the contacts of the second connector to receive and retain said energy from the pacing pulse to power said multiplexer.

52. The cardiac pacing system of claim 51 wherein the power conversion circuit further comprises:

a first diode connected between a pacing contact of the second connector and said multiplexer circuit to prevent voltage from the battery from being fed to said cardiac pacing device, while allowing said pacing pulse to be received by said capacitor; and

a second diode connected between said battery and said multiplexer to prevent said pacing pulse from interacting with said battery.

53. A method for selecting electrodes of a cardiac lead to be connected to input contacts of a cardiac stimulation device comprising the steps of:

placing the cardiac lead in contact with a patient's heart;

designating a sense electrode from said electrodes;

designating a pace electrode from said electrodes;

programming an adapter to connect the designated electrodes to the cardiac pacing device; and

connecting said adapter to said cardiac pacing device and said lead.

54. The method of claim 53 wherein said sense electrode is designated by testing said electrodes to detect sensed signals from said electrodes and selecting said sense electrode based on said sensed signals.

55. The method of claim 54 wherein said sense electrode is designated by determining a maximum sensed signal from said sensed signals.

56. The method of claim 53 wherein said pace electrode is designated by determining which pace electrodes are capable of capturing the heart.

57. The method of claim 56 further comprising applying pacing pulses to said electrodes.

58. The method of claim 57 further comprising determining a threshold level associated with each electrode.

59. A cardiac stimulation system comprising:

a plurality of electrodes adapted to contact a patient's heart;

an implantable cardiac stimulating device adapted to sense intrinsic cardiac activity in a patient's heart and to generate stimulation pulses corresponding to said intrinsic cardiac activity; and

an adapter connected to said plurality of electrodes and said cardiac stimulating device, said adapter being constructed and arranged to selectively couple a subset of said plurality of electrodes to said cardiac stimulating device to allow said cardiac stimulating device to sense said cardiac activity and to apply said stimulating pulses.

60. The system of claim 60 wherein said adapter couples a first subset of electrodes to said device for sensing said cardiac activity and a second subset set of electrodes for said stimulating pulser.

61. The system of claim 60 wherein said first set of electrodes is not coupled to said device while said stimulating pulses are applied.